Entrance Maze Locations for the Storage Ring Tunnel

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The Purpose of this note is to document the locations and decision rationale of the entrance mazes for the APS storage ring. There are a total of seven entrance mazes, four on the infield side and three on the operating floor side of the ring. Three of the infield mazes are associated with infield buildings, one in the Extraction Building and one each in the two RF Buildings. These three were located to provide convenient passage between the technical buildings and the storage ring components associated with those buildings. The Extraction Building maze allows passage between the positron beam transfer area and the storage ring two sectors upstream of the injection straight section (see Figure 1). The RF Building mazes provide passage between the RF Buildings and the storage ring tunnel (and to the tunnel roof as well) at a point between the two RF cavities (see Figure 2).

The remaining infield-side maze, which gives egress directly to the outside (and tunnel roof), was located midway between the nearest tunnel maze entrances to minimize travel distances within this region of the tunnel (see Figure 3).

All three of the operating floor mazes are located in regions of the floor devoid of photon beams due to the injection and RF equipment. The primary reason for these mazes is to provide additional access points for fire or other emergency situations. A stairway to the tunnel roof is also provided at these three mazes. The photon beam-to-wall clearance is increased from 0.8 meters to 1.5 meters in these maze entrances areas to provide an adequate fire lane without severely impacting the concrete volume. A long 1.5-meter-wide passage is provided at each maze entrance to insure a location where emergency personnel can duck under the beam lines to gain access to the ring walkway on the infield side. Two of these operating floor mazes are shown in Figures 1 and 2 in positions downstream from the Extraction Building and RF Building mazes.

Current planning has a movable block door located at all bending magnet beam ratchet corners, but these are not assumed to provide any emergency access benefit since they will require relatively slow activation.

All maze doors are part of a comprehensive radiation zone access-control system requiring intercom and possibly television monitoring upon entrance.

They will be operable in emergency situations by special break-glass and fire fighter keys and will, of course, break the storage ring interlock chain and dump any stored beam. Exit can be gained by standard crash-bar operation. The Extraction Building maze which gives egress only to the beam transfer area will have special interlocking and doors at each end of the maze, since it connects two separate radiation zone access-control systems and independently operable machines (see Figure 1).

Figure 4 depicts the entire machine and shows the location of all mazes. Those giving access to the infield side of the ring have their legends on the infield side and those leading to the operating floor have their legends on that side. The table below covers all mazes starting at the Extraction Building due north.

The following table summarizes pertinent dimensional data concerning all storage ring tunnel mazes. (Note that certain maze locations may change slightly due to ring building framing columns.)

Name	Angle from Due North (degrees)	Clock-Face Position	Travel Distance To Next (clockwise) Exit Maze
Extraction Building	0	12:00	79.5 m (260.8 ft)
Operating Floor (inj.)	27	1:00	225.3 m (738.8 ft)
RF Building (cavities 1 & 2)	103.5	3:30	26.5 m (86.9 ft)
Operating Floor (RF 1 & 2)	112.5	3:45	251.7 m (825.7 ft)
Infield (to outside)	198	6:30	251.7 m (825.7 ft)
RF Building (cavities 3 & 4)	283.5	9:30	26.5 m (86.9 ft)
Operating Floor (RF 3 & 4)	297	10:00	198.8 m (651.8 ft)

According to documentation supplied by Gorden Veerman (PFS-FD), travel distances in sprinkler-equipped areas should not be longer than 150 feet. By special ruling, travel distances can be increased to 400 feet if the following conditions are met:

(a) Limited to one-story buildings.

(b) Limit interior finish to Class A or B.

(c) Provide emergency lighting.

(d) Provide automatic sprinklers.

(e) Provide smoke and heat venting to insure that occupants shall not be overtaken by spread of fire or smoke within 6 feet of floor level.

The first four provisions have already been specified and the last will be passed on to Lester B. Knight as a design criterion for the tunnel ventilation system. A ventilation system is already required to remove generated ozone during normal operation and to provide for human occupancy when all hatches and block doors are closed during maintenance periods.

According to the above table, the longest travel distance between maze exit points is 825.7 feet, which corresponds to a worst case travel distance to an exit of 412.85 feet. According to Gorden Veerman, we should be able to qualify for the special ruling due to the low occupancy level during maintenance and trouble-shooting periods when the hatches and block doors are closed. (During long-term maintenance or beamline installation, various hatches and block doors will be open.)

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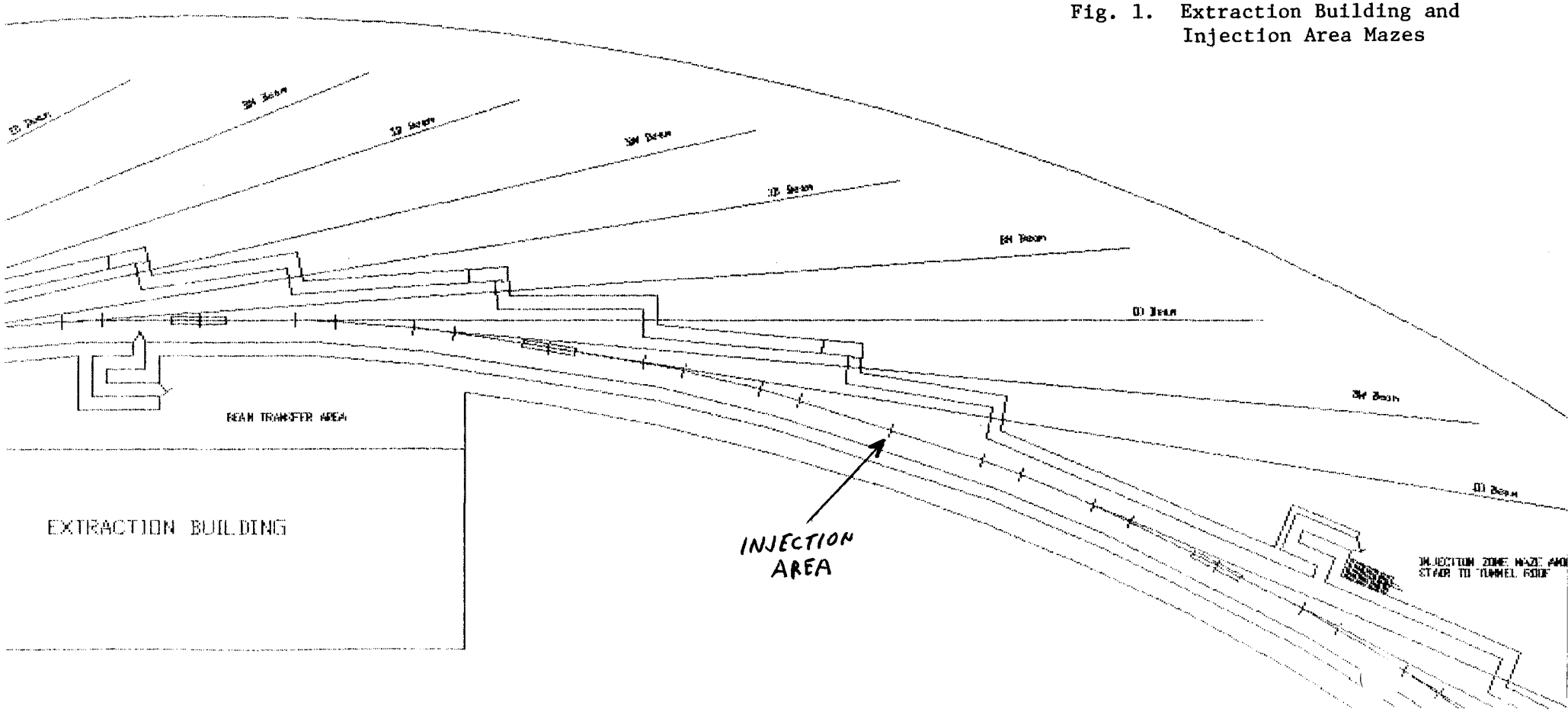


Fig. 1. Extraction Building and Injection Area Mazes

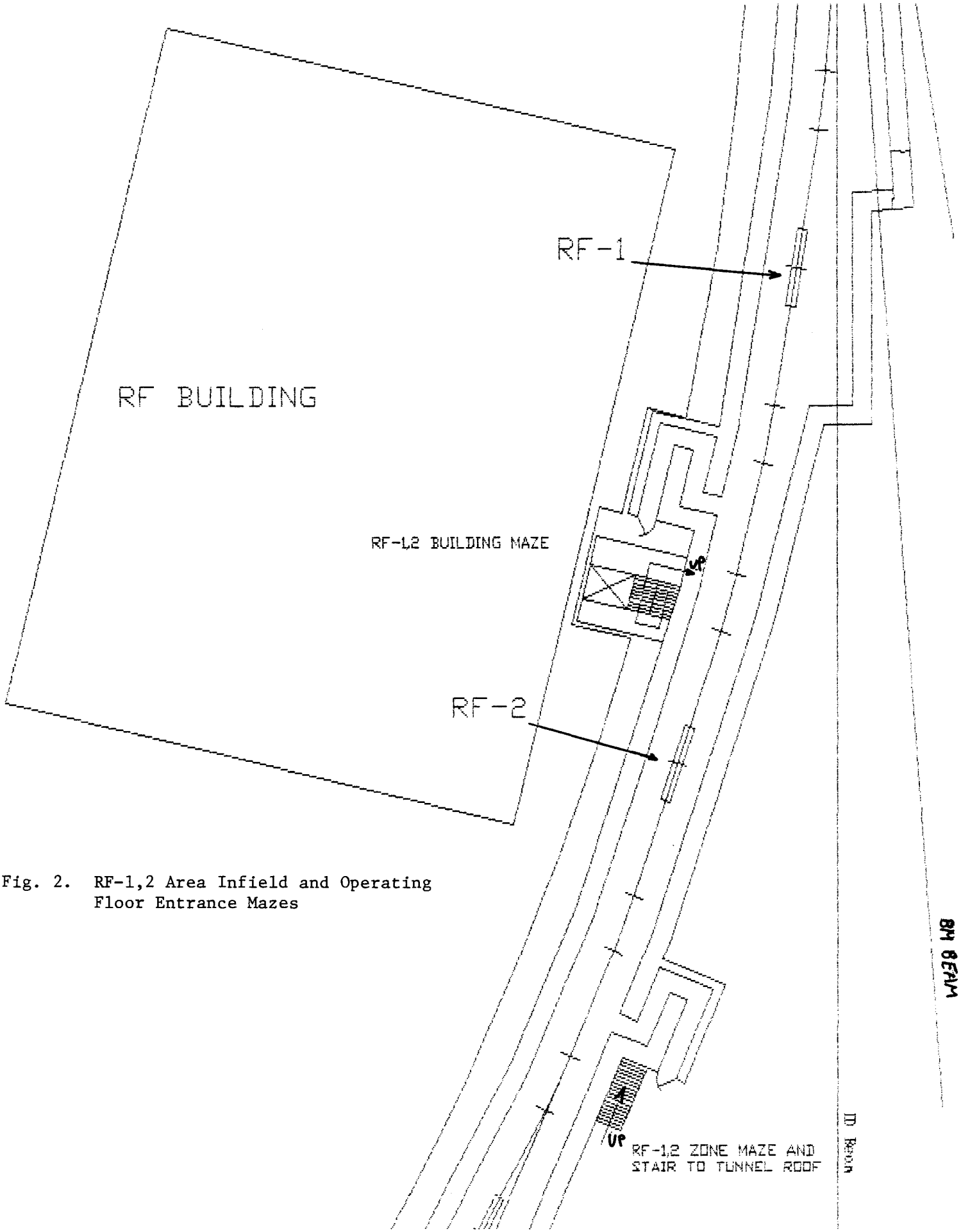
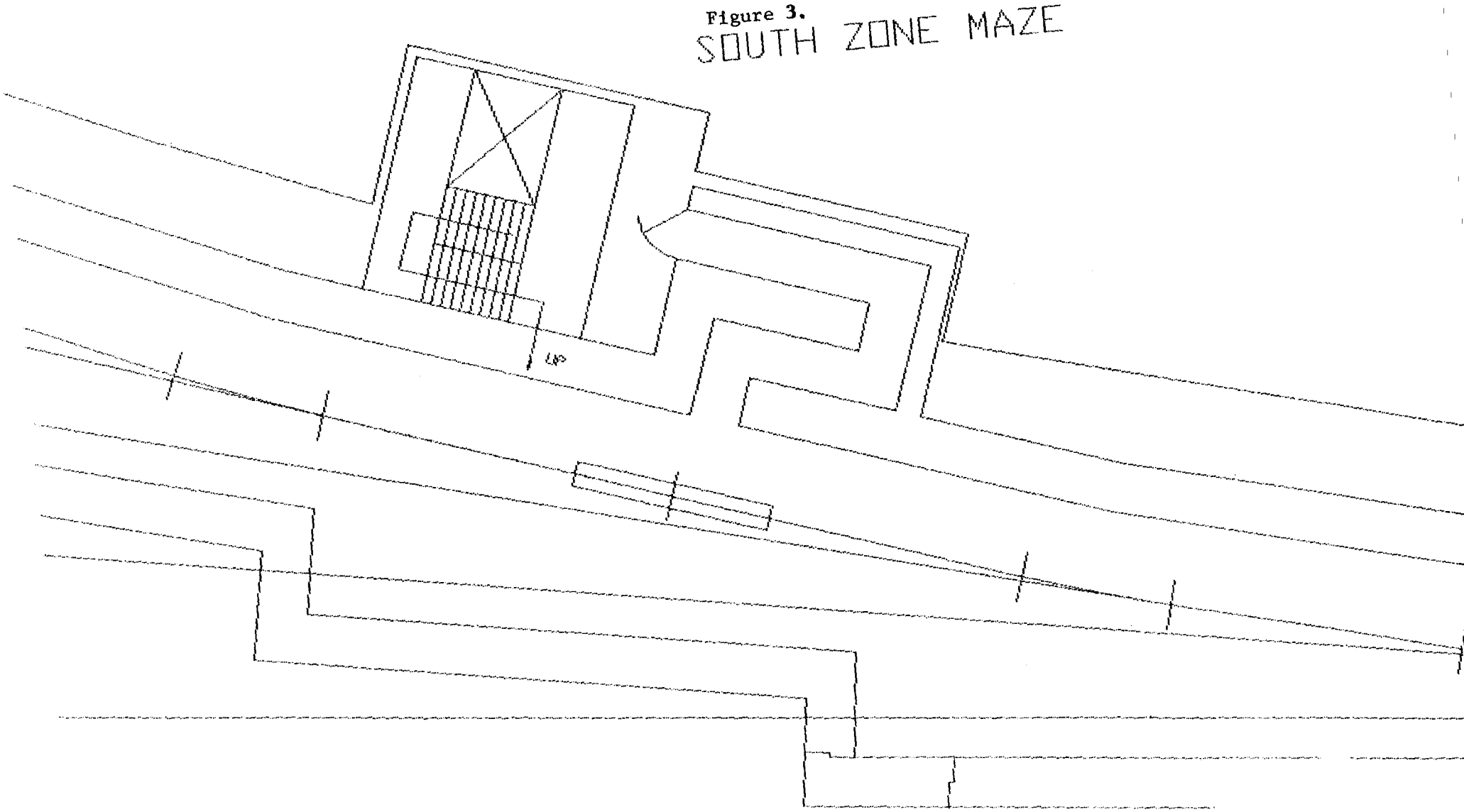


Fig. 2. RF-1,2 Area Infield and Operating Floor Entrance Mazes

Figure 3.



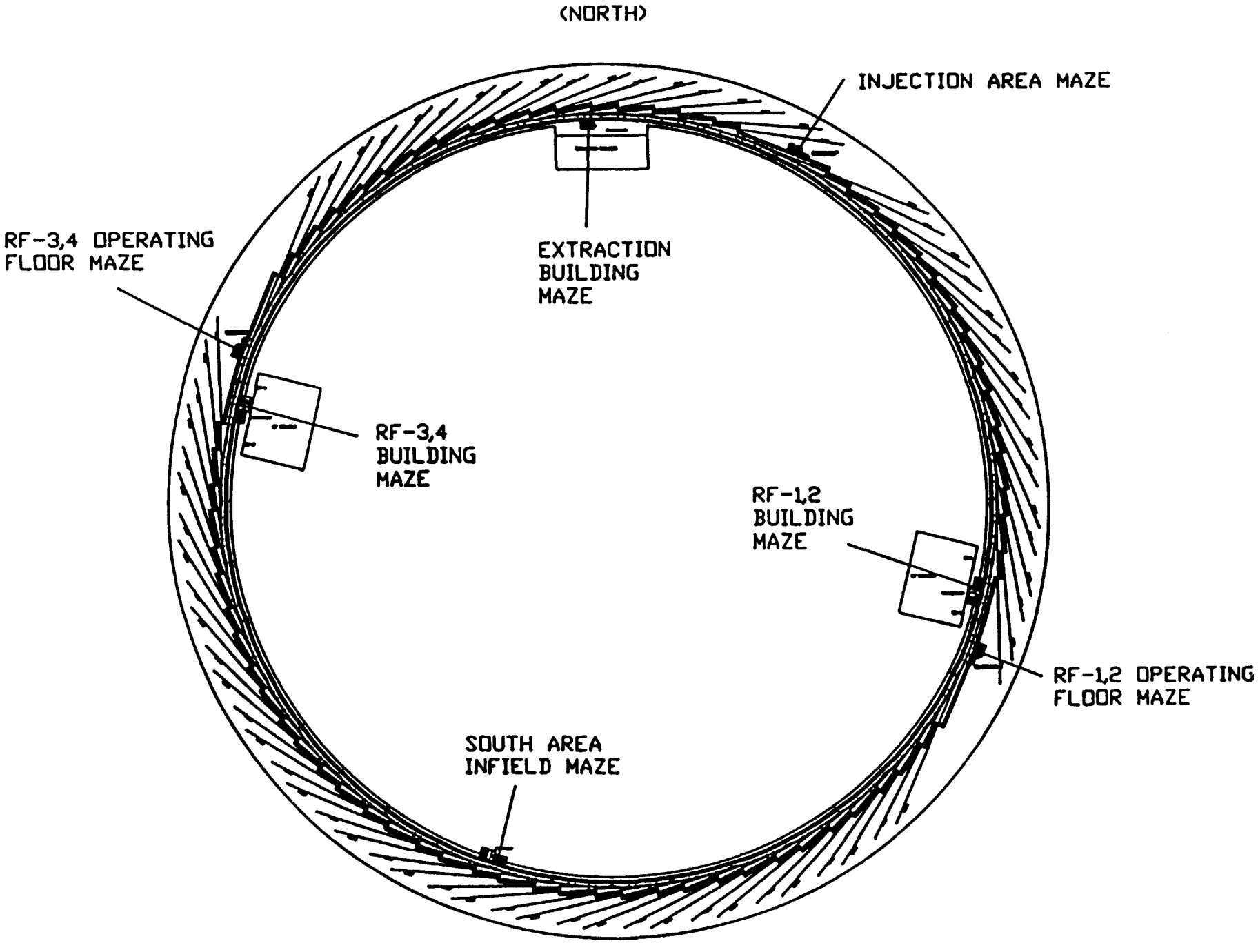


Fig. 4. Entire APS storage ring showing all tunnel access mazes.